



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/568,974	08/29/2006	Xiaodong Chen	41557-228416	3593
26694	7590	01/16/2008	EXAMINER	
VENABLE LLP			JOHNSON, RYAN	
P.O. BOX 34385			ART UNIT	
WASHINGTON, DC 20043-9998			2817	
			MAIL DATE	DELIVERY MODE
			01/16/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/568,974

Applicant(s)

CHEN ET AL.

Examiner

Ryan J. Johnson

Art Unit

2817

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date (2).
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☒ Other: UK document.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement filed February 21st, 2006 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.
3. The NPL document listed in the information disclosure statement filed August 29th, 2006 lacks a publication date. The document has therefore not been considered.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 9, 12-14 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
6. Claim 9 lacks antecedent basis for the term "the TEM wave". For the purpose of applying art, claim 9 will be considered dependent upon claim 8. Claims 13 and 14 are rejected merely for inheriting this deficiency from claim 9.

7. The term "each magnetron" is recited in claim 12. However, there is only one magnetron recited in previous claims. It is unclear if the scope of the claim includes one magnetron, as recited in claims 1-9, or an additional magnetron.

8. The term "the same RF locking signal" lacks antecedent basis. For the purpose of applying art, this term will be interpreted as "a same RF locking signal".

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1,2,4,6,7,11-12,16 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Kato et al. (U.S. Patent No. 5,162,698, as cited by applicant and hereinafter "Kato").

11. Regarding claims 1 and 16, Kato discloses a magnetron (any of the two magnetrons in the middle of the structure shown in Fig.1) comprising a cathode (32) surrounding an anode (12), and an interaction space 22 between the cathode and the anode for containing space charge (the potential between the cathode and anode creates a space charge, as inherent in magnetrons), the magnetron being operable at a frequency (col.3,36-38) and having a coupling arranged to receive an injected signal for coupling the injected signal to the cathode and having a signal phase, thereby causing the magnetron to operated according to the signal phase (the magnetrons are coupled to the left and right magnetrons via energy transferred through the coupling of the

cathodes and annular cavities, enabling phase locking of each magnetron body;
col.7,66-col.8,23).

12. Regarding claim 2, the coupling includes non-contact coupling of the annular cavities of each magnetron body, cathode shank 16, as well as non-contact output waveguide 24 via iris 26.

13. Regarding claim 4, Kato discloses a probe (26) extending into a waveguide (24; Fig.1; col.3,17-43).

14. Regarding claim 6, Kato discloses the probe (26) is a separate conductor (a separate quarter-wave transformer; col.3,32-34) coupled with the cathode (32) via each interaction space (30).

15. Regarding claim 7, the probe (26) is arranged to couple to the injected signal seen in the interaction space (30) forms as a wave in the waveguide 24 (the injected signal is received from annular cavities of the magnetron bodies to the left and right enabling phase locked as discussed above. The signal is further coupled to the iris 26 and output waveguide 24 in order to provide an output waveform).

16. Regarding claim 11, Kato discloses a plurality of magnetrons, each coupled to one another in cascade form (see Fig.1; abstract).

17. Regarding claim 12, Kato discloses a probe (26) extending into a waveguide (24) in each magnetron body.

18. Regarding claim 18, Kato discloses a plurality of magnetrons (each magnetron body; Fig.1) comprising coupling the cathodes of the plurality of magnetrons to a same RF locking signal, whereby each of the magnetrons operates according to the phase of

the locking signal (each magnetron is coupled to one another and operates in lock to the signal received from the previous stage; see abstract).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claims 1,2,4-9, 12, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brady et al. (U.K. Patent Application Publication No. GB 2,266,180 A, hereinafter "Brady") in view of Farney (U.S. Patent No. 5,084,651).

21. Regarding claims 1 and 16, Brady discloses a magnetron (Figs. 1,4) comprising a cathode (2) and an anode (1), the anode surrounding the cathode and being arranged to define an interaction space between the cathode and the anode for containing space charge (between the vanes 3; see abstract), the magnetron being operable at a frequency and having a coupling (10) to the cathode (via 10 the cavity 6). Brady, however, does not explicitly disclose structure that ensures coupling of an injecting waveform. However, injection-locked magnetrons utilizing circulators are well known in the art. Farney discloses using such an injection locked magnetron (Fig.1) utilizing a circulator (14) and a locking signal source (16) in order to provide a stable output waveform for use of a number of applications, including phase array radar and coherent radar (col.1,18-28). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the injection-locking scheme

comprising a reference signal and circulator, as disclosed by Farney, to couple a locking signal to the cathode of the magnetron disclosed by Brady in order to have provided the benefits of increased frequency stability required for a number of applications.

22. Regarding claim 2, Brady discloses that the coupling is non-contact coupling (cavity 6 and waveguide 12 are non-contact coupling).

23. Regarding claim 4, Brady discloses that the coupling comprises a probe (10) extending into a waveguide 12.

24. Regarding claim 5, Brady discloses that the probe comprises an extended portion of the cathode (the coaxial probe 10 extends along the same axis as the cathode 2; See 1a, Fig.1).

25. Regarding claim 6, Brady discloses that the probe comprises a separate conductor (coaxial probe 10) coupled with the cathode (2, via cavity 6).

26. Regarding claim 7, Brady discloses that the probe is arranged to coupled to the injected signal (via waveguide 12 and the circulator disclosed by Farney discussed above) formed as a wave in the waveguide, thereby coupling the injected signal to the cathode (via cavity 6).

27. Regarding claims 8, 9 and 17, in the combination of Brady and Farney, the injected signal is arranged to coupled to the cathode (via waveguide 12, probe 10, and cavity 6) and is capable of forming a TEM wave in the co-axial probe (10), which couples to the space charge (via cavity 6) to oscillate according to signal phase (as disclosed by the injection locked design of Farney).

28. Regarding claim 12, Brady discloses a probe (10) extending into a waveguide (12).

29. Claims 3, 10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brady in view of Farney as applied to claims 1 and 2 above, and further in view of Tsuzurabara et al. (U.S. Patent No. 4,419,606, hereinafter "Tsuzurabara"). Brady discloses that an electric potential is created across the cathode and anode (See page 4), as is required by a magnetron. Brady does not, however, disclose that the electric potential is achieved by applying a negative potential to the cathode with respect to ground. Coupling the cathode to a negative potential and the anode to ground is a well known configuration in order to generate such an electric potential, as disclosed by Tsuzurabara (col.2,68-col.3,2). Merely shifting the voltage of the cathode to ground and the anode to a high voltage, as required by claim 15, is a matter of design choice. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided either a high negative voltage or ground voltage to the cathode and either a ground voltage or high positive voltage to the anode respectively in order to have provided the required electric potential across the cathode and anode of the magnetron of Brady.

30. Brady also does not explicitly disclose the use of a choke, as required by claim 10. Tsuzurabara discloses using a choke (15,15') in a magnetron in order to reduce high frequency leakage (col.2,8-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a choke coil

coupled to the cathode, as disclosed by Tsuzurabara, in the circuit of Brady in order to have provided the benefits of high frequency leakage.

31. Claims 3, 10, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (U.S. Patent No. 5,162,698, as cited by applicant) in view of Tsuzurabara (U.S. Patent No. 4,419,606) for the same reasons discussed above.

32. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brady in view of Farney as applied to claim 1 above, and further in view of Esterson et al. (U.K. Patent Application Publication No. GB 2,228,841 A, as cited by applicant and hereinafter "Esterson"). Brady and Farney disclose the limitations of claim 1, but do not explicitly disclose a plurality of magnetrons, wherein each is coupled to the injected signal. Esterson discloses coupling multiple magnetrons to the same phase locking signal (abstract) in order to achieve a radiation pattern having high power density (Page 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used multiple injection-locked magnetrons of Brady and Farney locked to the same phase locking signal, as disclosed by Esterson, in order to have provided the benefit of a radiation pattern with high power density.

33. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brady in view of Farney and Esterson, for the same reasons discussed above.

34. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brady and Farney as applied to claim 1 above, and further in view of Charles et al. (U.S. Patent No. 2,880,356, as cited by applicant and hereinafter "Charles"). Brady and Farney disclose the limitations of claims 1,4,6 and 9, but do not explicitly disclose that the magnetron is used in a particle accelerator or a synchrotron. Charles discloses using magnetrons in a particle accelerator (G1-G6; Fig.2). A synchrotron is a well known particle accelerator that also utilizes magnetrons. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the magnetron of Brady and Farney in the particle accelerator of Charles or a well known synchrotron in order to have provided a suitable source of high power waveform generators.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Rosenberg (U.S. Patent No. 5,552,672) discloses a magnetron with the cathode coupled to ground and the anode coupled to a high positive voltage.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J. Johnson whose telephone number is 571-270-1264. The examiner can normally be reached on Monday - Thursday, 9:00 am - 5:00 pm EST.


Application/Control Number:
10/568,974
Art Unit: 2817

Page 10

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert J. Pascal can be reached on 571-272-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RJJ/



Robert J. Pascal
SPE 2817